

Serial No.: 09/438,600
Filed: November 12, 1999

Please enter the amendments below and consider the following remarks.

In the claims:

Please cancel Claims 1-15 and 21 without prejudice or disclaimer to Applicants' right to pursue the subject matter of this claim in one or more continuation, continuation-in-part, or divisional applications.

Please add the following claims:

1 ~~22~~. A microfluidic device comprising:

- i) a first microchannel;
- ii) at least a first entrance port and at least a first exit port for the transportation of at least one test sample;
- iii) a fluid propelling component that controls the flow rate of said test sample;
- iv) a detector that detects a binding pair in said test sample; and
- v) a recirculating arm that recirculates said test sample back into said first microchannel;

wherein said first microchannel comprises a plurality of spacially distinct regions upon which specific binding pair members are immobilized.

2
23. A microfluidic device according to claim ~~22~~¹ wherein said first microchannel is serpentine.

3
24. A microfluidic device according to claim ~~22~~¹¹ further comprising at least one valve in said

Serial No.: 09/438,600
Filed: November 12, 1999

exit port.

⁴
~~25~~. A microfluidic device according to claim ^{1.}~~22~~ wherein said first microchannel branches into multiple second microfluidic channels each of which comprises a plurality of spacially distinct regions upon which specific binding pair members are immobilized.

⁵
^{9/19/01} ~~26~~. A microfluidic device according to claim ^{1 or 4}~~22 and 25~~ wherein said device is fabricated from a material selected from the group consisting of silicon, silicon dioxide, glass, plastic and ceramic.

⁶
^{B1} ^{cond} ~~27~~. A microfluidic device according to claim ¹~~22~~ wherein said spacially distinct regions comprise porous polymers.

⁷
~~28~~. A microfluidic device according to claim ¹~~22~~ wherein each of said spacially distinct regions has a different immobilized specific binding pair member.

⁸
~~29~~. A microfluidic device according to claim ^{1 6}~~27~~ wherein said porous polymer is a hydrogel pad.

⁹
~~30~~. A microfluidic device according to claim ⁸~~29~~ wherein said hydrogel pad is a patterned gel

Serial No.: 09/438,600
Filed: November 12, 1999

pad further comprising spatially separated portions within said hydrogel pad.

¹⁰
~~31.~~ A microfluidic device according to claim ¹~~22~~ wherein said spacially distinct regions in said microchannel comprise beads with said immobilized binding pair members.

¹¹
~~32.~~ A microfluidic device according to claim ^{- 1}~~22~~ wherein said spacially distinct regions comprise microstructures fabricated into said microchannel.

¹²
~~33.~~ A microfluidic device according to claim ^{/ 11}~~32~~ wherein said microstructures comprise a series of columns molded into said first microchannel.

¹³
~~34.~~ A microfluidic device according to claim ["]~~32~~ wherein said microstructures comprise domes molded into said first microchannel.

¹⁴
~~35.~~ A microfluidic device according to claim ¹~~22~~ wherein said specific binding pair members are nucleic acids.

¹⁵
~~36.~~ A microfluidic device according to claim ¹⁴~~35~~ wherein said nucleic acid is a DNA.

¹⁶
~~37.~~ A microfluidic device according to claim ¹⁴~~35~~ wherein said nucleic acid is a RNA.

Serial No.: 09/438,600
Filed: November 12, 1999

¹⁷
~~38~~. A microfluidic device according to claim ¹~~22~~ wherein said specific binding pair members are proteins.

¹⁸
~~39~~. A microfluidic device according to claim ¹⁷~~38~~ wherein said proteins are antigens.

¹⁹
~~40~~. A microfluidic device according to claim ¹⁷~~38~~ wherein said proteins are antibodies.

²⁰
~~41~~. A microfluidic device according to claim ¹~~22~~ wherein said fluid propelling component comprises a pressurized gas, a vacuum, an electrical field, a magnetic field or a centrifugal force.

²¹
~~42~~. A microfluidic device according to claim ¹~~22~~ wherein said detector is an optical, electrical or electrochemical detector.

²²
~~43~~. A method of detecting a specific binding member in a test sample, said method comprising:

- i) passing said test sample through the microfluidic device described in claims ¹~~22~~, ²~~23~~ or ⁴~~25~~ to form a binding pair ;
- ii) detecting said binding pair.

Serial No.: 09/438,600
Filed: November 12, 1999

²³
44. A method according to claim ¹⁹~~40~~ wherein said test sample is recirculated prior to said detecting.

*B1 cond
2/19/01*
²⁴
45. A method according to claim ~~32 and 33~~ ^{43 22} wherein ^{the}~~the~~ flow rate of said test sample is adjusted using ^{said}~~said~~ fluid propelling component to allow maximum contact between said binding pairs.

REMARKS

Applicants gratefully acknowledge the withdrawal of the 35 U.S.C. § 112 rejections.

Claims 1-15 and 21 have been canceled. Claims 22-45 have been added.

Support for claim 22, 43 and 45 can be found in the specification on page 5, lines 10-20.

Support for claims 23, 27, 35 and 36 can be found in the specification on page 8, lines 1-4.

Support for claims 24 and 44 can be found in the specification on page 7, lines 8-9.

Support for claims 25, 28 and 31 can be found in the specification on page 8, lines 20-22.

Support for claim 26 can be found in the specification on page 7, lines 11-14.

Support for claim 29 can be found in the specification on page 8, lines 4-5.

Support for claim 30 can be found in the specification on page 8, lines 9-10.

Support for claims 32, 33 and 34 can be found in the specification on page 8, lines 12-15.

Support for claims 35, 36, 37, 38, 39 and 40 can be found in the specification on page 2, lines 10-

13.